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Antral-Ethmoidal Decompression in Graves' Disease

Five-Year Experience

THOMAS C. CALCATERRA, MD, *and* ROBERT S. HEPLER, MD, *Los Angeles*

The orbital manifestations of Graves' disease frequently constitute the major and distressing portion of the morbidity in this poorly understood process. Patients with optic neuropathy, exposure keratopathy or disfiguring proptosis may be aided considerably by decompression to permit swollen orbital contents to move into the maxillary and ethmoid sinus cavities. Experience with 38 patients treated over a five-year period indicates that antral-ethmoidal decompression is a logical, successful form of therapy and generally free of serious complications. It may provide benefit earlier in the course of Graves' exophthalmopathy than has been accepted in the past.

PATHOGENESIS AND TREATMENT of ophthalmopathy associated with Graves' disease remain poorly understood. The major clinical problems in the treatment of patients arise from the often extreme hypertrophy of orbital muscles and fat, which, together, produce increased intraorbital pressure and forward displacement of the eyes. Proptosis of the globes may lead to a variety of difficulties that range in severity from cosmetic disfigurement to permanent blindness. Medical, radiotherapeutic and surgical measures have been used in an attempt to lessen the exophthalmos, with varying degrees of success. It appears that one reliable method consists of antral-ethmoidal decompression of the orbital contents. The authors' personal experience employing this operative treatment in 38 patients provides the basis for this report.

Despite extensive experimental investigation, no specific antibody or hormone has been proved to be responsible for the ophthalmopathy of Graves' disease. Even the relationship to the patient's hyperthyroidism is confusing, since the exophthalmos may develop before, during or after the hyperthyroid state and frequently appears after the hyperthyroidism has been treated and the patient returned to a euthyroid state.

Degree of proptosis is not a reliable indicator of the severity of the disease and the risk to vision. Variability in effect upon the ocular structures may be related to individual differences, such as tightness of the orbital septum and lids, tension of the rectus muscles and length of the optic

From the Departments of Surgery/Division of Head and Neck Surgery (Dr. Calcaterra), and Ophthalmology (Dr. Hepler), University of California, Los Angeles, School of Medicine.

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Reprint requests to: Thomas C. Calcaterra, MD, Department of Surgery, University of California, Los Angeles, Center for the Health Sciences, Los Angeles, CA 90024.

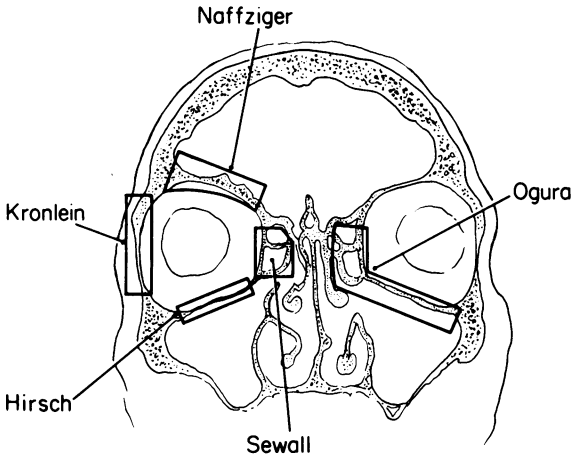

Figure 1.—Coronal section of skull showing the portions of orbit removed in various methods used for decompression.

nerve. Enlargement of the extraocular muscles, up to as much as eight times their normal size, occurs with the deposition of mucopolysaccharides; in addition, the orbital adipose tissue becomes edematous. Chronic inflammatory cell infiltration and fibrosis of the muscles may occur, particularly in later stages of the disorder.

Dollinger[1] first reported orbital decompression by removal of the lateral wall of the bony orbit (Kronlein's operation) to allow the orbital contents to herniate into the temporal fossa. Two decades later, Naffziger[2] published the first report of decompression of the orbital contents into the anterior cranial fossa by a transcranial approach. Use of the paranasal sinus cavities to decompress the orbit was described by Sewall[3] who removed the common wall between the ethmoid sinuses and the orbit to provide a medial decompression. Hirsch[4] later reported inferior decompression into the maxillary sinus achieved by removal of the orbital floor. Walsh and Ogura[5] combined the operations of Hirsch and Sewall, removing both the medial and inferior walls of the orbit (Figure 1). The antral-ethmoidal method of orbital decompression was the operation used in this study group.

Methods and Material

Between January 1970 and January 1975, 38 patients with Graves' exophthalmopathy were treated at the University of California, Los Angeles, Hospital by the antral-ethmoidal decompression method. All patients received ophthalmologic evaluation before and after operation and were followed for a minimum of six months.

Surgical Indications

Patients in the study series had a variety of signs and symptoms, most of which appeared to be related to increased orbital pressure. Most complained of excessive tearing and photophobia. The more serious symptoms of ocular pain and decreased vision usually reflected either exposure keratitis or optic neuropathy. Diplopia was seen frequently in patients with severe proptosis and in those in the later stages of the disorder.

In 21 of the patients (55 percent), there was some degree of optic neuropathy manifested by reduced vision with clinical signs of optic nerve dysfunction. Some, but not all, of these patients with optic neuropathy had visible optic nerve head swelling. Five patients with optic neuropathy and seven without had exposure keratopathy refractory to treatment with artificial tears and ocular lubricant ointments. Ten patients without keratopathy or optic neuropathy underwent decompression, primarily for cosmetic reasons or because of severe ocular discomfort. Almost all patients had evidence of extraocular muscle weakness, but less than a third (11 patients) had persistent and troublesome diplopia preoperatively.

Duration of time from onset of exophthalmos to operation varied from three months to nine years. Vision-threatening complications were present in those patients with shorter preoperative intervals, whereas cosmetic considerations were generally primary when the proptosis was long-standing. Of the patients, 34 had received steroid therapy during the course of the illness, and 22 were receiving steroids at the time of operation. In most patients, the systemic steroids relieved the ocular symptoms initially, but either a recurrence of the original ocular problems or a complication of the steroid treatment necessitated its discontinuation.

Surgical Technique

Clinical hyperthyroidism is corrected medically, with ^{131}iodine in some patients, whenever possible before operation. Documentation of adequate sinus pneumatization and freedom from inflammatory disease is ascertained by sinus x-ray films. Patients currently or recently receiving systemic steroids are prepared by parenteral corticosteroids given on the evening and morning before operation.

Decompression is carried out with the patient under general endotracheal anesthesia in a semi-

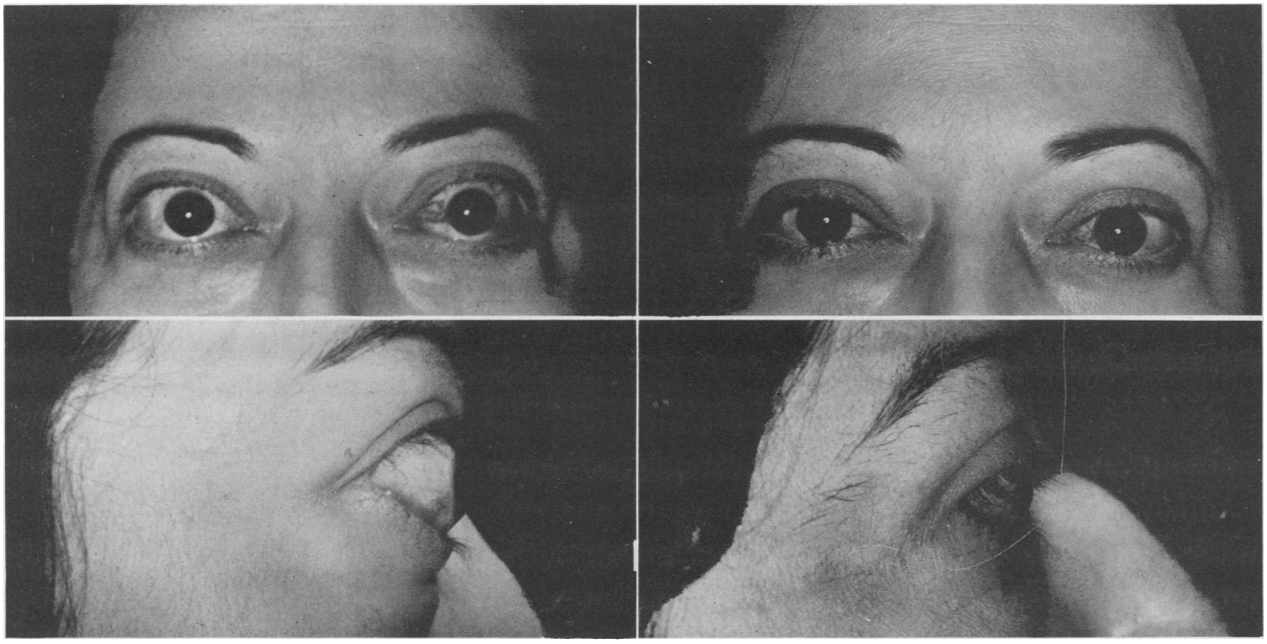

Figure 2.—Preoperative and postoperative frontal and lateral views of a patient with Graves' disease treated by antral-ethmoidal decompression. Recession of 6.5 mm was achieved.

sitting position. The legs are wrapped with elastic bandages to prevent venous pooling. The eyes remain uncovered so that they may be observed during the operative procedure. A sublabial incision is made to approach the maxillary and ethmoid sinuses. Ethmoid cells are exenterated to the cribriform plate with the anterior and posterior ethmoidal arteries used as landmarks. The orbital floor and lamina papyracea are fractured in an eggshell fashion and removed, while the orbital periosteum, infraorbital nerve and orbital rim are preserved. Orbital periosteum sags considerably after the removal of bone. Additional resection may be achieved by incision of the orbital periosteum with radial cuts, allowing the orbital fat to herniate through the incision. The effect is monitored by a gas sterilized exophthalmometer, the number and extent of the periosteal incisions being increased until the desired level of recession in achieved.[6] The orbit with the most proptotic eye is approached first, preserving at least some periosteal support. Then the opposite, less proptotic orbit is decompressed until the two eyes are approximately equal. In no instance is periorbital fat dissected from around the muscles. It is important to anticipate and allow for the additional 1 to 2 mm of recession that develops invariably within the first postoperative month. A conventional nasal antrostomy is created through the inferior meatus of the nose. The entire procedure may be done upon both orbits in about an hour, and the patient is usually discharged on the second postoperative day.

Results

The average recession achieved was 4.2 mm, with the range between 2 and 9 mm. In general, the greater the proptosis, the greater was the achieved recession of the globe (Figures 2 and 3). In some instances in which the exophthalmos was long-standing, the periorbital fat was fibrotic and had limited tendency to herniate through the periorbital incisions, reducing the effect of the procedure.

All patients with exposure keratitis were improved sufficiently to discontinue local medical management. Some improvement in vision was noted in almost all patients with short-term neuropathy. Visual return, which was occasionally dramatic, was usually noted in the immediate postoperative period and was assumed to be secondary to the decrease in orbital pressure. Five patients had either little improvement in vision or a delayed decrease in visual acuity that was managed by irradiation therapy in three patients and intermittent steroid therapy in the other two patients.

Decompression for cosmetic purposes was successful as a single operation when there was no

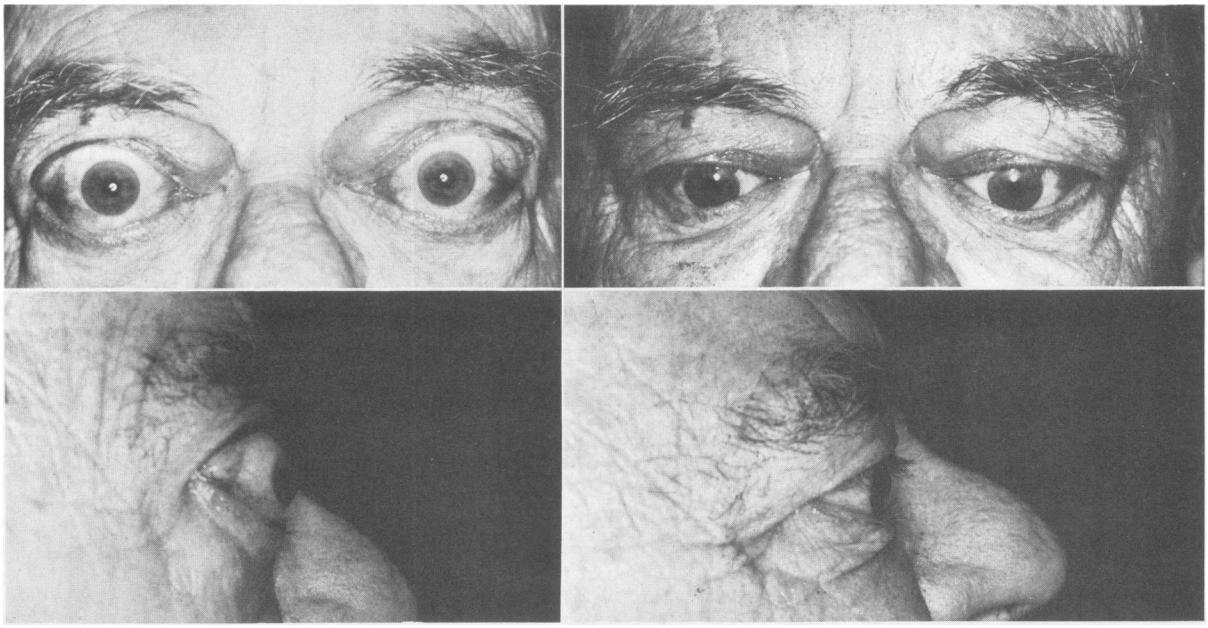

Figure 3.—Views of another patient in the series showing operative results with 6 mm of recession obtained.

significant lid retraction. Levator spasm did not improve after decompression, and two patients required additional operative procedures to lengthen the levator muscle. In only one patient without preoperative diplopia did double vision develop postoperatively, and the disturbance was limited to upward gaze. Five patients with preoperative diplopia underwent subsequent extraocular muscle operation. In these five patients, the prior decompression of the orbit appeared to facilitate the muscle procedure, and in all five patients the diplopia was improved or cured.

Complications

Late recession of the orbital contents resulted in relative enophthalmos in two patients that was of sufficient magnitude to permit the lower arc of the corneal scleral limbus to become covered by the lower lid. Recurrent maxillary sinusitis in one patient resolved after revision of the naso-antral window. Diplopia on upward gaze that had not been present preoperatively developed in one patient. All patients experienced temporary numbness of the cheek and upper lip, attributable to traction on the inferior orbital nerve, but normal sensation generally returned by three months. In no patient was numbness permanent. There were no instances of either fracture of the cribriform plate with cerebrospinal fluid leakage or injury to the optic nerve as a result of the surgical procedure.

Discussion

Patients with dysthyroid ophthalmopathy are seen with a spectrum of ocular involvement. Some can be managed conservatively with eye drops and eyelid closure with tape at night. However, when vision is threatened by exposure keratopathy or optic neuropathy, more vigorous treatment is indicated. Unfortunately, systemic corticosteroids usually provide only temporary remission, and local repository placement of corticosteroid material within the orbit is a relatively new and controversial form of therapy.

Antral-ethmoidal decompression has the advantage of utilizing an air-containing space, therefore achieving more effect than is possible with either a lateral or a superior (cranial) decompression. In both such approaches, soft tissue compromises the space available for orbital recession, and more than 3 mm of recession can seldom be accomplished. The antral-ethmoidal approach, on the other hand, permits as much as 11 mm, and the amount of recession can be controlled. The cranial approach is an extensive procedure with a small but significant risk of intracranial complications and requirement for prolonged postoperative care. In addition, pulsations transmitted to the globe from the intracranial tissues may be annoying to the patient. The lateral approach requires a facial incision that extends posteriorly from the lateral canthus.

None of the decompressive operations correct

diplopia in any predictable manner, because they do not influence the myopathy that is primarily responsible for diplopia in Graves' disease. In fact, diplopia may be even more troublesome to a patient after a decompressive procedure, particularly if visual acuity is substantially improved. A planned ocular muscle surgical procedure after decompression is facilitated because the eye is restored to a more normal position, and tension on already damaged muscles is reduced, allowing more precise muscle manipulation.[7]

Until more specific therapy is discovered to prevent or reverse the orbital complications of Graves' disease, some patients will require orbital decompression. Whereas this surgical procedure was once reserved for patients with advanced disease, particularly those with threatened blindness, our experience with antral-ethmoidal decompression indicates that use of the procedure is reasonable at less advanced stages of the disease and is very likely preferable to long-term high dosage steroid therapy. In those patients with severe proptosis without visual impairment, antral-ethmoidal decompression offers a satisfactory method of providing substantial improvement in a disfigured appearance.

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Combining Pseudopregnancy with Surgery for Endometriosis

. . . At present the only indication in my mind for the use of preoperative pseudopregnancy is if there is extensive fixation of the uterus in third degree retroversion, extensive ovarian endometriosis with fixation of the tube and with the thought that I am going to have a very difficult dissection and I may have a very difficult time with preservation of the structures. With these patients, I utilize either norethynodrel with mestranol (Enovid-E®) or norethynodrel with ethinyl estradiol (Ovral®) in pseudopregnancy form for 8 to 12 weeks preoperatively. Postoperative pseudopregnancy, I think, is indicated only in those patients who have residual endometriosis—for example, on the bladder serosa or on the bowel ilia, the large bowel—at the termination of the surgical procedures. If I am confident that I have excised . . . all areas of endometriosis and I have adequately peritonealized all of these areas, I do not believe that the postoperative use of pseudopregnancy is advantageous.

—ROBERT W. KISTNER, MD, *Boston*

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